

# ES&H manual

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## Environment, Safety, and Health

### Volume II

#### Part 10: Occupational Health

## 10.2 LLNL Health Hazard Communication Program

(Formerly H&SM S7.02)

Recommended for approval by the ES&H Working Group

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New document or new requirements

Approval date: July 25, 2000  
Editorial Update: April 1, 2001

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This work performed under the auspices of the U.S. Department of Energy by University of California Lawrence Livermore National Laboratory under Contract W-7405-ENG-48.

## 10.2

## LLNL Health Hazard Communication Program\*

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## 10.2

### LLNL Health Hazard Communication Program

## 1.0 Introduction

### 1.1 Purpose and Scope

The U.S. Department of Energy (DOE) contract with the University of California (UC) for the management of LLNL (Contract 48) specifies that the Laboratory shall establish a Health Hazard Communication Program (also known as a "Haz Com" or "right-to-know" program) for chemical and physical agent hazards that may be present in the workplace. DOE also requires contractors such as the Laboratory to establish a comprehensive program that

- Informs workers of the
  - Presence of workplace chemical and biological materials, physical agents, and physical hazards.
  - Potential harmful effects of these hazards.
  - Appropriate control measures.
- Provides written notification to employees on the results of environmental monitoring, particularly when employees have been exposed to levels above permissible limits.
- Explains the content of applicable hazard communication standards and orders.

The LLNL Health Hazard Communication Program (this document) was designed to assure the Laboratory's compliance with both Occupational Safety and Health Administration (OSHA) (29 CFR 1910.1200) and DOE requirements. It contains

- Mandatory requirements for chemical and biological materials and physical agents.
- Procedures for monitoring exposure and notifying employees of the results.
- Haz Com training for workers.
- Best management practices for ergonomic issues.

The program applies to all hazardous materials workers (Laboratory employees, supplemental workers, subcontractors, and visitors) and to all general workplaces such as shops and offices. In addition, the program described in this document is used to communicate the presence of hazards to workers who may be transient in the area, such as protective force officers and custodial staff.

The Haz Com requirements for laboratories (see definition in Appendix A) are documented in Document 14.2, "LLNL Chemical Hygiene Plan for Laboratories," in the *Environment, Safety, and Health (ES&H) Manual*. However, to provide a complete description of the LLNL Health Hazard Communication Program, some of those requirements are repeated here because they pertain to the hazardous materials and agents addressed in this document.

## 1.2 Exceptions

The following items are not covered by OSHA regulations governing chemical health hazard communication and, by extension, are excluded from this document unless specified otherwise:

- Any consumer product or hazardous substance used in the workplace in the same manner, duration, and frequency as normal consumer use. For example, cans of spray paint intended for short, one-application use would not be covered by this program. However, routine use of one or more of such materials by a technician or craftsperson would be covered. Users must understand the hazards of consumer products and use them in accordance with the guidance specified on container labels or other similar warnings.
- Any hazardous waste that is subject to regulations established by the Environmental Protection Agency.
- Tobacco or tobacco products.
- Wood or wood products when the only hazard is flammability or combustibility. Wood or wood products that have been treated with a hazardous chemical—including wood that may be subsequently sawed, sanded, cut (generating dust), or burned—are not exempt.
- Articles, that is, manufactured items that do not release hazardous chemicals under normal-use conditions. If an article is used in a manner different from its intended use or if it is machined, heated, or otherwise handled in a manner that might lead to exposure or cause a hazard, it may no longer be considered an article.
- Food, medications, or cosmetics intended for personal use by employees while in the workplace.
- Any prescription drug in final form that is administered to patients. Note that when a pharmaceutical is used in a manner not otherwise exempt, this standard program applies.

### 1.3 "Right-to-Know" Information

People who use chemical and biological materials, and those who may be exposed to physical agents and ergonomic problems, have a right to know of the hazards posed by such materials. At LLNL, this information is provided to workers through Hazard Notice Door Signs. In addition, Integration Work Sheets (IWSs), and safety plans (Operational Safety Plans [OSPs] and Facility Safety Plans [FSPs]) are provided to all assigned workers in the area, and are available to all temporary or visiting workers. The following additional resources are available to workers:

- Material safety data sheets (MSDSs) provided by the manufacturer or vendor of the chemical or product or from (ChemTrack). They can be obtained by accessing the ChemTrack/MSDS website from the following Internet address:

<http://chemtrack.llnl.gov>

contacting the ChemTrack/MSDS hotline at ext. 4-4404, or emailing the MSDS Coordinator at [msds@llnl.gov](mailto:msds@llnl.gov)

- The label, or other forms of warning, on containers, equipment, and other sources of hazardous agents.
- Formal and informal training.
- Chemical Hygiene Plan for Laboratories (refer to Document 14.2 for additional information).
- Hazardous material inventories obtained through the LLNL ChemTrack system. This database includes a detailed listing of primary chemical containers in each work area. The ChemTrack web site may be accessed at

<http://chemtrack.llnl.gov>.

- ES&H Teams.

Before beginning work with any new material, workers must be sure to read the product label or refer to the other sources listed above for hazard warnings and precautionary information.

LLNL work supervisors, Responsible Individuals, and facility points of contact will provide outside contractors with hazard information relevant to their work area. They also shall keep the ES&H Team (and contractors) abreast of substantial changes that may occur while contractors are working onsite. In turn, contractors shall

- Provide the contracting officer a chemical hazard list and the MSDSs for materials brought onsite.
- Refer all problems to the contract administrator, construction supervisor in Plant Engineering, or the appropriate ES&H Team.

## **1.4 Medical Records**

Employees have a right to know the results of any medical examinations completed or ordered by Health Services. Results are reported to employees by the cognizant clinician.

Health Services maintains complete medical records for each employee. These records are confidential and are only released upon receipt of a written request from the employee (or his/her designee). Records are made available within 15 working days upon receipt of a written request.

# **2.0 Hazards**

Work at LLNL involves chemical and biological materials, physical agents, and physical hazards. These hazards are outlined in the following sections.

## **2.1 Chemical Hazards**

Chemical materials can cause bodily harm if not properly used. Manufacturers (producers) and importers of hazardous chemical materials are primarily responsible for evaluating their hazards, appropriately labeling containers, and preparing the MSDS for each hazardous product. The Laboratory is also responsible for complying with this requirement for any new chemical it synthesizes and sends offsite.

## **2.2 Biological Hazards**

Biological materials can cause illness and infection. Examples of potential sources of exposure to biological hazards are as follows:

- Human fluids, secretions, or feces.
- Class II and III etiologic agents.
- Infectious agents from animal infestation or droppings.
- Biological toxins.
- Human cell and tissue culture systems.
- Research involving animals.
- Research involving allergens of biological origin (e.g., certain plants and animal products, danders, urine, and some enzymes).
- Laundry soiled with blood or other potentially infectious materials.



- Contaminated sharps.
- Unfixed human tissues or organs.

## **2.3 Physical Agents**

The physical agents specifically addressed in this document are noise and nonionizing radiation because they are the most common at LLNL (see Appendix A, Terms and Definitions). Other hazards that may be encountered include heat and cold, ultrasonic and infrasonic sound, vibration, and pressure extremes.

### **2.3.1 Noise**

Exposure to high noise levels and repeated exposure to loud-impact noise can lead to hearing loss. If there is reason to believe that over exposure to noise is possible or if any of the following conditions exist, the employee or supervisor shall notify the ES&H Team, which will conduct a noise survey:

- Normal conversation is difficult.
- There are complaints about noise levels.
- Repeated loud-impact noises are produced.
- Hearing protectors are required.

Document 18.6, "Hearing Conservation," in the *ES&H Manual* contains more detailed information about noise.

### **2.3.2 Nonionizing Radiation**

Nonionizing radiation has the potential to cause bodily harm at certain power levels and exposure conditions. The physical agents covered in this section are electromagnetic fields (e.g., static fields, intense power line and subradiofrequency fields, radio-frequency fields, and microwave radiation), lasers, and nonlaser sources of optical radiation (e.g., infrared, visible, and ultraviolet). Document 11.2, "Hazards—General and Miscellaneous," and Document 20.8, "Lasers," in the *ES&H Manual* provide more detailed information.

Controls such as barriers, interlocks, and procedures limit the risk of exposure that may be caused by a specific activity or piece of equipment. Section B.2 of Appendix B of this document provides a nonexhaustive list of agents that can cause significant occupational exposure. For these agents, workers must consult their area ES&H Team, which will assist in determining the type of protective equipment and operating conditions required and the power levels that may be hazardous.

## **2.4 Physical Hazards**

### **2.4.1 Ergonomic Hazards**

The field of ergonomics addresses hazards that are prevalent in every type of workplace and that can result in acute or chronic musculoskeletal injuries. These hazards are usually caused by manual material handling, repetitive use of hand tools, repetitive motion at computer workstations, or other human and work environment interfaces.

For other ergonomic hazards that may be present in the work area, contact your ES&H Team.

### **2.4.2 Other Physical Hazards**

Hazards associated with nonergonomic physical hazards include injuries from machinery (e.g., crushing, laceration, amputation, etc.), overpressurization, electricity (e.g., shocks and burns), and radiation exposure. Controls for these hazards can be found in Document 12.1, "Access Control, Safety Signs, Safety Interlocks, and Alarm Systems," Document 11.2, Document 16.1, "Electrical Safety," Document 18.1, "Pressure," and Document 20.1, "Occupational Radiation Protection" in the *ES&H Manual*.

## **3.0 Controls for Chemical and Biological Materials, Physical Agents, and Physical Hazards**

The LLNL Health Hazard Communication Program, as described in this document, presents general controls for hazards from chemical and biological materials and physical agents (see Appendix A, Terms and Definitions). The controls specified in Sections 3.1, 3.2, and 3.3 are mandatory and apply to all work areas where chemical and biological materials are used or where physical agents are of concern. Section 3.4 contains some best management practices for addressing ergonomics problems resulting from repetitive use of equipment. Section 3.5 addresses training and training records.

### **3.1 Chemical Materials**

#### **3.1.1 Material Safety Data Sheets**

LLNL uses MSDSs to provide information about chemical hazards to workers. A collection or set of MSDSs does not need to be in each work area.

**MSDSs in the Workplace.** The following requirements apply to MSDSs in the work area:

- Official copies are available, on-line at the following Internet address:

<http://chemtrack.llnl.gov>

Paper or electronic copies of the MSDSs for products in use must be accessible to all workers on all shifts.

- MSDSs received with incoming shipments must be sent to the MSDS Center, L-621 (fax 3-9027), if one is not already present on the LLNL MSDS website.
- The MSDS for materials that are being or have been eliminated from an area shall be deleted from the local files provided they are available in the central MSDS system. If they are not available via the central MSDS system, the MSDSs must be sent to MSDS Center at L-621.

**Obtaining MSDSs.** An MSDS for a product should be obtained when a material's label shows the product may be hazardous and whenever there is a need to obtain additional information about the safety and health characteristics of a material.

Supervisors and employees can also obtain the MSDS for specific products by calling the MSDS hotline (ext. 4-4404), by sending e-mail to [msds@llnl.gov](mailto:msds@llnl.gov), faxing (ext. 3-9027) the MSDS coordinator, or completing the MSDS Request Form (see Appendix C) and mailing it to the MSDS coordinator at L-621. MSDSs can also be obtained from the Internet address previously provided.

Supervisors who receive hazardous materials (e.g., blanket orders or samples) directly from outside sources must request the MSDS and forward a copy to the MSDS coordinator for filing. Those who receive MSDSs directly from vendors also must send a copy to the same address, including the name of the Laboratory user, ChemTrack bar code number, and the building and room number(s) where the material is located.

**MSDSs for Purchasing Materials.** All requests for the purchase of hazardous materials must be processed through the Procurement & Materiel Department. Upon receipt of a requisition, and prior to placing the order, Procurement & Materiel (or other Laboratory requester, e.g., technical release representative [TRRs]) will contact the manufacturer (vendor) and request the MSDS and forward a copy to the MSDS coordinator (L-621) with the order number.

Requesters shall check the appropriate boxes in the "Does order involve?" section on the purchase requisition. *Do not* check the "None of these" box unless you are certain that it is nonhazardous. When unsure if the material is hazardous, contact the area ES&H Team for guidance. Note that the purchasing process will not slow down if the appropriate boxes are checked because Hazards Control reviews requisitions after the order is placed.

Work supervisors shall review purchase requisitions prior to submission to Procurement & Materiel. Hazards Control reviews requisitions for the OSHA-regulated substances listed in Table 1, as well as those for commercial products containing such materials (e.g., silver-brazing alloys that contain cadmium, lead-alloy solder, or adhesives or cleaners that contain methylene chloride) to ensure compliance with OSHA requirements. For assistance with the substances listed in Table 1, contact the ES&H Team or refer to 29 CFR 1910.1001–1048 for more details. The ES&H Team will also review MSDSs for completeness and accuracy upon request.

**Table 1.** OSHA-regulated substances that require Hazards Control review and may require air monitoring.

Substances requiring exposure monitoring	Substances that <i>do not</i> require air monitoring
Acrylonitrile	2-Acetylaminofluorene
Arsenic, inorganic	4-Aminodiphenyl
Asbestos <sup>a</sup>	Benzidine
Benzene	Bis(chloromethyl) ether
1,3-Butadiene	3,3'-Dichlorobenzidine (and its salts)
Cadmium	4-Dimethylaminoazobenzene
Coal tar pitch volatiles <sup>b</sup>	Ethyleneimine
1,2-Dibromo-3-chloropropane	Methyl chloromethyl ether
Ethylene oxide	1-Naphthylamine
Formaldehyde	2-Naphthylamine
Lead <sup>c</sup>	4-Nitrobiphenyl
Methylene chloride	N-nitrosodimethylamine
4,4'-Methylene dianiline	2-Propiolactone <sup>d</sup>
Vinyl chloride	

<sup>a</sup> Document 14.9, "Safe Handling of Asbestos-Containing Material during Construction Work," in the *ES&H Manual* contains detailed information.

<sup>b</sup> Similar chemistry applies to coal gasification, oil-shale research, or burning of gun propellants in vacuum.

<sup>c</sup> Document 14.10, "Safe Handling of Lead and Lead Compounds in General Industry and Construction Operations," in the *ES&H Manual* contains detailed information.

<sup>d</sup> American Conference of Governmental Industrial Hygienists (ACGIH) specifies an airborne Threshold Limit Value (TLV). Refer to Document 14.12, "Safe Handling of Carcinogenic Materials," in the *ES&H Manual*.

Document 21.1, "Acquisition, Receipt, Transportation, and Tracking of Hazardous Materials," in the *ES&H Manual* contains more information on ordering controlled substances. A list of controlled items is found at the following Internet address:

<http://www-r.llnl.gov/pm/>

**MSDSs for Chemicals Developed at LLNL.** Materials developed by LLNL shall receive appropriate toxicological evaluation / testing if the material is to enter commercial or military use or be used by another worker onsite. Arrangements for screening shall be made with the knowledge and agreement of the area ES&H Team industrial hygienist and the Technical Support and Policy Development Division of Hazards Control. Guidelines for the preparation of MSDSs are contained in Appendix C. A copy of LLNL-prepared MSDSs must be forwarded to the MSDS Center, L-621.

### 3.1.2 Labels and Hazard Advisory Signs

Labels and signs consist of a signal word ("CAUTION", "WARNING", or "DANGER"), text, and a graphic symbol. A description of the conditions when the signal words are used follows:

1. "DANGER" signs shall be used to indicate an imminently hazardous situation which, if not avoided, will result in death or serious injury. The signal word should be limited to the most extreme situations. "DANGER" signs are also used for asbestos and some radiological protection applications.
2. "WARNING" signs shall be used to indicate a potentially hazardous situation which, if not avoided, could result in death or serious injury.
3. "CAUTION" signs shall be used to indicate a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. These signs may also be used to warn against unsafe practices and for some radiological protection applications.

As use of "WARNING" signs becomes more widespread outside of LLNL, the Laboratory is receiving more modern mechanical, electrical, and hazardous equipment with these signs (however, "WARNING" signs are not used for radiological protection). Document 12.1 contains the National Fire Protection Association's 704 and the National Paint and Coatings Association's Hazardous Materials Information System (HMIS) warning labels. Chemical handlers should be familiar with these labels because they may be affixed to containers, equipment, and vehicles sent by vendors to LLNL. For more information on label formats and unique labeling situations, contact your area ES&H Team.

Samples of hazard advisory signs can be found in Document 12.1.

**Container Labeling.** The following labeling requirements apply to hazardous materials used onsite or shipped offsite:

- The manufacturer's original label must identify the hazardous chemical(s); the appropriate hazard warnings; and the name and address of the chemical manufacturer, importer, or responsible party. This label shall not be removed, changed, or defaced in any way unless the container is immediately marked

with the required information. If the label is illegible or missing, or appears to be deficient, contact the supplier for the complete information.

- Primary chemical containers (i.e., those shipped by the manufacturer) shall be bar coded and included in LLNL's ChemTrack inventory.
- When materials are transferred from the original container to a secondary container (e.g., safety cans, bottles, or plastic jars), the latter must have the identity of the hazardous chemical(s) and the appropriate hazard warning. For laboratories, labels with formulas, symbols, and codes may be used. Alternatives to individually labeling small containers may be necessary due to a lack of space on the container itself. In such cases, signs, placards, or other written means may be used to indicate the hazardous contents of stationary process containers and their appropriate warnings.
- Workers who ship hazardous chemicals offsite must ensure that the label on the container lists the hazardous ingredients; the appropriate hazard warnings; and the name and address of the manufacturer, importer, or other responsible party.
- Mixtures with less than 0.1% of a carcinogen or other hazardous materials diluted below 1% need not be labeled as carcinogens or hazardous materials. This exemption does not apply to some highly toxic materials that could present a chemical health hazard below these concentrations.
- Hazardous waste containers shall have a label clearly identifying special hazards (e.g., carcinogens) and the minimum required information.
- Pipes and piping systems are not considered containers for the purposes of this program; however, labeling them is required. 29 CFR 1910.253, "Oxygen-Fuel Gas Welding and Cutting," does mandate pipe labeling in welding applications.
- Classified materials may be labeled with a code name, but health and safety hazard information is still required.

### 3.1.3 Information and Training

**Information.** All workers who work with chemical materials shall be informed of the following by their work supervisors:

- Overall purpose and requirements of the LLNL Health Hazard Communication Program. (This information is covered in Course HS0001, "New Employee Safety Orientation.")
- Any operation in the work area that involves hazardous chemicals.

- The location and availability of this document.
- Hazards in the area (the Hazard Notice Door Sign generally meets these requirements).
- How to obtain MSDSs for chemicals used in the work area.

Most of this information is available on the Hazard Notice Door Sign (see Appendix B) posted at the entrance to the work area.

**Training.** Authorizing organizations are responsible for ensuring that employees who may be potentially exposed to chemical health hazards are educated and trained in hazard recognition and the precautions for specific agents in use on the job. Appendix D contains a list of formal Haz Com courses. In addition, complete course information can be found in the LLNL Course Catalog at the following Internet address:

[https://www-ais.llnl.gov/llnl\\_only/docs/hr/catalog/](https://www-ais.llnl.gov/llnl_only/docs/hr/catalog/)

*Worker training.* Workers shall be trained for the hazards associated with their work and any time a new hazard is introduced. At minimum, this training shall cover the following, as appropriate:

- The physical and health hazards of the chemicals in the work area.
- Methods and observations (e.g., sight, smell, color change, monitors, alarms) that may be used to detect the presence or release of a hazardous chemical in the work area.
- Measures employees can take to protect themselves from hazards (e.g., following safety procedures and using protective equipment).
- Reading, interpreting, and preparing container labels; reading and interpreting MSDSs; and reporting work-related illnesses and injuries to Health Services.
- The actions necessary in the event of spills or emergencies. (This information is often contained in OSPs and FSPs).

*Follow-on Training.* Subsequent training must be provided to ensure that task- and area-specific details are covered. Training can be provided through a combination of formal courses (e.g., HS4240-CBT and EP0006) and on-the-job training. Training by categories of materials is acceptable provided that the hazards of groups of materials are similar. For example, no new training is required for a new solvent having similar hazards to an existing chemical for which training has been completed. A briefing or review of the FSP or OSP may meet the requirement for follow-on training.

*Nonroutine tasks.* The potential hazards of nonroutine tasks (e.g., cleaning tanks, working on unlabeled pipes, or infrequent maintenance operations) shall be discussed with employees before each job. The precautions for each task shall be discussed with the ES&H Team during the planning phase, as specified in Document 2.2, "Managing ES&H for LLNL Work," in the *ES&H Manual*.

### 3.1.4 Exposure Monitoring

As required by OSHA regulations, Hazards Control monitors employee exposure for the substances in the first column of Table 1 and evaluates the work practices of program, facility, and service organizations for those in the second. Monitoring results are used to select and verify the adequacy of engineering, administrative, and personal protective equipment (PPE) controls and to determine the need for medical surveillance. Work supervisors or employees shall contact their area ES&H Team to make monitoring arrangements prior to beginning work with these substances.

Listed below is the frequency of monitoring for some operations involving hazardous materials. These frequencies can be modified by the area ES&H Team industrial hygienist in writing based on experience gained during workplace monitoring activities. Other operations are monitored on a case-by-case basis.

- Triennially for operations capable of generating air contamination with the potential to exceed OSHA-permissible exposure limits. This frequency is not necessary if it can be demonstrated that the operation and nature of the potentially hazardous materials make exposure impossible or when engineered controls are in place and their performance has not deteriorated. Administrative controls and PPE shall not be used as grounds to avoid conducting employee monitoring. Examples of such operations that may require triennial monitoring include
  - Spray treatment using toxic materials, open surface tank work, grinding, and abrasive blasting.
  - Welding where stainless steel is cut using oxygen or where materials other than mild steel, stainless steel, and aluminum are welded or brazed. This includes using silver brazing alloys that contain cadmium. This also includes galvanized articles and copper.
  - Plasma cutting.
  - Spray painting using two-component polyurethane products or hexavalent chromium-containing coatings.
  - Dressing of tungsten carbide tools.
  - Heating or burning of organic materials such as nitrogen-containing polymers (e.g., epoxies, polyurethanes, isocyanates/diisocyanates, amines, amides, or imides), which can create hydrogen cyanide as well as carbon monoxide; acrylonitrile butadiene styrene (ABS), other



acrylonitrile polymers, and polyvinyl chloride (PVC) or other vinyl chloride polymers; and gun propellants when personnel could inhale or touch the solid or gaseous combustion products.

- Production of complex, incomplete reaction products from organic compounds. OSHA has standards for coke ovens and coal tar pitch volatiles based on the generation of "polycyclic aromatic hydrocarbons," proven human carcinogens, in such processes. LLNL applications where similar chemistry could occur include oil-shale work, coal gasification, and firing gun propellants under vacuum conditions.
  - Cutting or sanding hard woods.
- At least once during cleanout, maintenance, or repair of air cleaners used to remove toxic materials from grinders, buffers, polishers, or abrasive blasters. For example, if the cleaner was used to remove fiberglass and lead, then samples would be collected for both sets of materials.
  - When annual performance testing or other information reveals that the performance of a ventilation system for a welding, spray treatment, open surface tank, grinding, abrasive blasting, or other ventilated industrial operation has decreased to inadequate levels (e.g., lack of appropriate engineering design criteria or previously measured ventilation levels known to be associated with acceptable concentrations of air contaminants). Air sampling may revert to a routine frequency if two sets of air samples spaced at least three months apart demonstrate compliance with occupational exposure criteria for the air contaminants.
  - When there is a substantial change in a ventilation system used to control exposure to chemical health hazards (e.g., adding new hoods, adding bends and elbows to ductwork, or changing exhaust fans).

OSHA normally mandates air sampling based on the results of employee monitoring; however, OSHA does *not* approach asbestos and lead in the same way, as discussed in Documents 14.9, "Safe Handling of Asbestos-Containing Material during Construction Work," and 14.10, "Safe Handling of Lead and Lead Compounds in General Industry and Construction Operations," in the *ES&H Manual*.. Because air sampling only gives an incomplete view of the overall potential employee exposure, biological monitoring of employees may be necessary.

Biological monitoring is required for certain operations when specified by OSHA or DOE regulations (e.g., for inorganic lead and cadmium). Biological monitoring should be conducted for skin-penetrating materials, such as 2-ethoxy ethanol (Cellosolve), 2-methoxy ethanol (Methyl Cellosolve), their acetates, and thallium hydroxide. The type of material collected in biological monitoring depends on the specific toxic substance of concern. The most common materials used for biological monitoring are urine and blood. Biological monitoring for situations where there are no requirements is

determined by the area management, ES&H Team industrial hygienist, and Health Services clinician. Contact the area ES&H industrial hygienist for additional information about biological monitoring.

Workplace monitoring results usually provide assurance to employees and management that acceptable working conditions exist. Results showing excessive exposure will trigger action to reduce exposures to acceptable levels. For example, written notification (e.g., memos, Health Hazard Assessments, or a copy of an e-mail from the cognizant industrial hygienist) is provided to both payroll and work supervisors if monitoring results indicate that an employee's exposure level is above OSHA's permissible exposure limit. The supervisors are then responsible for getting the information to the employees and, if appropriate, taking actions to reduce employee exposures to acceptable levels. Monitoring results are tracked by DOE Oakland Operations Office (DOE-OAK) under a provision in Contract 48.

### 3.2 Biological Materials

Controls and training requirements for preventing exposure to bloodborne pathogens are covered in 29 CFR 1910.1030. Requirements for biological and other hazards are broadly covered in DOE O 440.1A. This section describes both OSHA and DOE requirements for biological materials. It includes situations where biohazards may be present, labeling and posting requirements, and training for employees who potentially may be exposed to hazardous materials. Additional controls can be found in Document 13.1, "Biological Controls and Operations," in the *ES&H Manual*.

#### 3.2.1 Labels and Signs

**Labels.** Readily observable warning labels shall be affixed to the containers and equipment listed below.

- Containers used to store, transport, or ship specimens.
- Containers of regulated waste (decontaminated waste need not be labeled or color-coded).
- Refrigerators and freezers containing blood or other potentially infectious material.
- Contaminated laundry, equipment, or sharps container.

In some cases, red bags or containers may be substituted for labels.

Exemption to this requirement is possible for the item(s) remaining within a facility that uses universal precautions. The ES&H Team can provide guidance on variances permitted by 29 CFR 1910.1030.

**Signs.** Hazard warning signs and the identity of biological agents shall be posted outside work areas where operations may involve exposure to bloodborne diseases such as the human immunodeficiency virus (HIV) or hepatitis B virus (HBV). Other labels and signs used shall have the universal biohazard warning and be fluorescent orange (or orange-red) with lettering and symbols in a contrasting color.

If any of the other hazards listed in Section B.2 of Appendix B is also present in the work area, the appropriate boxes on the Hazard Notice Door Sign shall be checked.

### 3.2.2 Information and Training

Employees who potentially may be exposed to bloodborne pathogens at work must receive training at the time of initial assignment and at least annually thereafter. Additional training shall be provided when changes in tasks or procedures may result in potential exposure. At a minimum, when it is applicable to the work being performed, training shall cover the topics listed below.

- The content of 29 CFR 1910.1030 and where it is available.
- Epidemiology and symptoms of bloodborne disease and the modes of transmitting bloodborne pathogens.
- Document 13.2, "Exposure Control Plan: Working Safely with Blood and Bloodborne Pathogens," in the *ES&H Manual*.
- Methods for recognizing tasks or other activities that may involve exposure to blood and other potentially infectious materials.
- Methods for preventing or reducing exposure and their limitations, including controls, work practices, and PPE.
- The types of PPE available to workers; the basis for selection; and procedures for using, removing, handling, decontaminating, and disposing of such equipment.
- Procedures for exposure incidents, including reporting and medical follow-up procedures.
- The signs, labels, and color-coding used to communicate the presence of biohazards.
- The hepatitis B vaccine and its efficacy, safety, method of administration, and benefits. This vaccine is provided free of charge to Laboratory employees who potentially could be exposed to hepatitis B.
- The precautions necessary during an emergency where blood or other potentially infectious materials are involved, as well as the persons to contact.

The person conducting the training shall be knowledgeable in all topics and how they pertain to specific workplaces.

Hazards Control offers Course HS4400 (Working Safely with Blood and Bloodborne Pathogens) to employees who work directly with human blood, tissues, or other body fluids. Employees who work in laboratories where HIV or HBV research is performed, or in production laboratories, must receive additional training. More details can be found in 29 CFR 1910.1030 or in the LLNL Course Catalog. The area ES&H Team or the directorate training coordinator can also provide information.

### **3.2.3 Potable Water Quality and Microbiological Exposure Monitoring**

The Laboratory's water supply is subject to routine bacteriological and chemical sampling, as described in Document 13.3, "Sanitation," in the *ES&H Manual*. Results are compared to mandatory water quality standards, and any findings are provided to Plant Engineering for resolution.

Precise standards do not exist for biological agents in the air or on surfaces as they do for chemical air contaminants or physical agents. However, in support of indoor air quality investigations, the Laboratory may conduct exposure monitoring to determine if microorganisms may be present in buildings that could present a potential health risk to occupants. Air or surface monitoring may also be performed as part of the LLNL Biohazards Program (see Document 13.1) to assess exposure from biological agents that is a direct consequence of work (e.g., in microbiological laboratories or sewer lines). The need for this type of monitoring is determined on a case-by-case basis.

ES&H Teams provide written notification (e.g., memos, Health Hazard Assessments, or e-mail) to supervisors if monitoring results indicate that an employee's exposure level is potentially excessive. The supervisors are then responsible for getting the information to the employee.

## **3.3 Physical Agents**

This section discusses the general controls for noise and nonionizing radiation. For additional information on these topics, refer to Document 18.6 and Document 20.7, "Nonionizing Radiation and Fields (Electromagnetic Fields and Radiation with Frequencies Below 300 GHz)," in the *ES&H Manual*. When planning work that may involve exposure to other physical agents, contact the area ES&H Team for assistance on the appropriate training and hazard communication needs. For some new activities, new methods or criteria for measuring exposures may need to be developed.

### 3.3.1 Noise

**Labels and Signs.** Work areas with excessive noise levels shall be posted with warnings indicating the need for hearing protectors. The Hazard Notice Door Sign shall be used to warn people entering a facility or an area of potential noise exposure. When practical, warning labels shall be affixed to noisy equipment indicating that hearing protection is required during operation. The area ES&H Team will assist facility management and work supervisors in determining where signs are to be posted.

**Information and Training.** Workers who may be exposed to noise above the permissible limits, or those who are in a hearing conservation program (i.e., audiometric testing), shall take Course HS4360-CBT (Noise) at the time of initial assignment to an area where there is a high level of noise. Refresher training (Course HS4361, Noise for Hearing Conservation) is required annually or whenever work processes or hearing protectors change. A challenge quiz may be taken in lieu of this course.

**Exposure Monitoring.** Work supervisors are responsible for ensuring that noise monitoring is conducted as required by OSHA whenever overexposures are possible or suspected. ES&H Teams provide written notification to employees whose environmental monitoring results indicate that exposure is above permissible limits.

### 3.3.2 Nonionizing Radiation

**Hazard Identification.** The physical agents covered in this section are electromagnetic fields (static fields, intense power line and subradiofrequency fields, radio-frequency fields, and microwave radiation), lasers, and nonlaser sources of optical radiation (infrared, visible, and ultraviolet). Each has the potential to cause bodily harm at certain power levels and exposure circumstances. Controls such as barriers, interlocks, and procedures limit the risk of exposure that may be presented by a specific activity or piece of equipment. Document 11.2 and Document 20.8 provide more detailed information.

The list of physical agents in Section B.2 of Appendix B includes common examples of sources that can present significant nonionizing radiation occupational exposure. For these agents, workers must consult their area ES&H Team for assistance determining the type of protective equipment and operating conditions required and the power levels that may be hazardous.

**Labels and Signs.** The Hazard Notice Door Sign shall be used to indicate the presence of all physical hazards and the precautions necessary prior to entering the work area. This sign may be supplemented with a higher level warning or danger sign, as required by ANSI Z-136.1-1993 and Institute of Electrical and Electronic Engineers guidance. More detailed requirements can be found in Document 20.8 and Document 20.7.

**Information and Training.** Workers who could be exposed to nonionizing fields or radiation emitted by the sources listed in Section B.2 of Appendix B shall complete an appropriate course in the HS437X series (Nonionizing Radiation). Employees who work with or near exposed Class 3b or 4 laser light, or those who service any system containing such energy, shall complete Course HS5200-CBT (Laser Safety).

**Exposure Monitoring.** Monitoring for nonionizing radiation is specified in Document 20.7. Exposures to emissions from equipment with frequencies from 0 Hz to 300 GHz must be measured.

Before laser work is performed, the power density levels are calculated, and safety controls are implemented; however, laser survey meters are available for use if needed. Survey meters are available for nonlaser sources of ultraviolet through near-infrared energy wavelengths between 180–1000 nm.

### 3.4 Ergonomics

Document 19.1, "LLNL Ergonomics Program," and Document 15.2, "Manual and Mechanical Material Handling," in the *ES&H Manual* fully describes the Laboratory's Ergonomics Program.

#### 3.4.1 Labels and Signs

There is no standard that requires specific posting of ergonomic hazards. However, good safety practices are recommended (e.g., a potential equipment user should be notified of any unusual or special procedures and any hidden hazards).

#### 3.4.2 Information and Training

**Information.** The purpose of the Ergonomics Program is to reduce the risk of injuries or illnesses associated with repetitive motion and material-handling operations. The ES&H Team safety engineer and Health Services provide supervisors and workers information about ergonomic hazards, recommend possible solutions, and conduct workplace evaluations upon request. An evaluation is recommended for workers who

- Use computer workstations extensively.
- Perform manual material handling.
- Use hand tools frequently and for prolonged periods of time.
- Use standard equipment or a single workplace design when they are of varying body sizes.
- Perform heavy physical activities or extended work hours and shift variations.

Solutions to problems associated with ergonomics (or human factors) may involve biomechanics, engineering controls, and best management practices, or review of the ongoing processes, tools and equipment, and personnel associated with an activity. Also, knowledge of past problems can be useful in recognizing potential new ones

Printed informational materials, one-on-one rehabilitation training, and workstation evaluation are available upon request from either Health Services or Hazards Control.

**Training.** Health Services and Hazards Control offer standard and specialized courses on ergonomics (see Appendix D) that focus on recognizing and preventing illness and injury. Complete descriptions for these courses can be found in the LLNL Course Catalog.

### 3.4.3 Exposure Monitoring

Ergonomic evaluators perform evaluations in accordance with the requirements in Document 19.1. The results are documented either in a memo or on the Ergonomic Evaluation Form and sent to affected employees and their work supervisors.

## 3.5 Training

The courses specified in Appendix D, in addition to local training provided by work supervisors with assistance from Hazards Control, fully meet Haz Com training requirements. Because the courses for the LLNL Health Hazard Communication Program may change over time, supervisors and workers must be sure to check the LLNL Course Catalog for the most up-to-date information.

Hazards training must be kept current with an ongoing program that includes safety meetings, ES&H courses, and discussions between workers and supervisors.

### 3.5.1 Training Records

All formal training shall be documented in accordance with the requirements given in Document 40.1, "LLNL Training Program Manual," in the *ES&H Manual* and any applicable directorate or facility procedures. Training records shall be maintained for at least 75 years from the date of training and shall include the date training was provided, the content (or a summary) of the course, the name of the person conducting the training, and the name and job title of the person taking the training.

Employees should be provided a copy of their training records upon request.

## 4.0 Trade Secrets and Classified Materials

It is not permissible to withhold information at the risk of causing harm to employees. Under normal circumstances, the exact identity of proprietary or classified agents may be protected using trade names or codes. However, the underlying health and safety hazards must be made clear so that precautionary measures and employee training can be implemented. ES&H disciplines (i.e., industrial hygienists, safety engineers, health physicists, physicians, and nurse practitioners) shall be given access to the specific identity of materials when needed to protect or evaluate employee health.

During emergencies (e.g., fires, spills, or work exposures), knowing the exact composition of a material may not be as important as knowing the proper procedure to follow to control the situation. Thus, careful consideration shall be given to the possible adverse effects of materials, and Responsible Individuals or work supervisors shall develop appropriate plans (in accordance with Document 2.2). (This precaution can improve response time because the necessary information will be ready.) Furthermore, emergency procedures should be prepared and medical treatments should be planned in anticipation of future needs. These measures can be instituted without compromising safety or security. The MSDS provides basic first aid and emergency medical guidance for chemical hazards.

### 4.1 Trade Secrets

Some manufacturers have bona fide secret formulas for their products. In a medical emergency or for first-aid treatment, however, these manufacturers must immediately disclose the identity of their products to the physician or nurse administering care. (Note that manufacturers may require a written statement of confidentiality after the emergency.) In a nonemergency, employees may request such information in writing, giving sufficient occupational health reason(s) why the information is needed (e.g., exposure assessment, medical surveillance or treatment, assessment or selection of engineering controls, or PPE). Even then, the manufacturer (supplier) may choose to release the information only upon request from an industrial hygienist or health-care provider.

Further disclosure of trade secrets within LLNL must be controlled because manufacturers have a right to demand a written agreement that the information provided will not be used for any other purpose. Any such agreement between LLNL and an outside vendor shall be handled by Laboratory Counsel.



## 4.2 Classified Materials

Unclassified emergency response plans (medical and fire) should be prepared in advance. The purpose of preplanning is to eliminate any delay in treatment or response while the issue of classification is being resolved. Response plans shall be reviewed by the program, Classification Office, and ES&H staff to ensure that all factors are properly addressed without revealing protected information. Select ES&H individuals are granted a need-to-know status in some instances.

**Note:** In the event of an emergency where a worker is at risk for serious adverse health effects or death, the primary consideration is to protect that worker. Security issues become secondary.

# 5.0 Responsibilities

The responsibilities for each person and organization with regard to the LLNL Health Hazard Communication Program are listed under each title in this section. Overall health and safety responsibilities are specified in Document 2.1, "Laboratory and ES&H Policies, General Worker Responsibilities, and Integrated Safety Management," in the *ES&H Manual*.

## 5.1 Authorizing Individuals

Authorizing individuals ensure that health hazard communication programs are implemented in accordance with the *ES&H Manual*.

## 5.2 Work Supervisors and Facility Points of Contact

Appendix A contains the definitions of "work supervisor" and "payroll supervisor." Although one person may fill both roles in many situations, it is mandatory that organizations designate a work supervisor for each room and for any other location where health hazards exist.

As appropriate to the work activities for which they are responsible, facility points of contact and work supervisors shall

- Inform employees, unescorted visitors, and contractors about LLNL's requirements for health and safety and notify them of hazardous conditions and necessary precautions. Make sure that safety requirements are consistently enforced since one work area may contain the activities of multiple projects, workers, and supervisors.

- Identify hazards that may be present in the work area. When hazards change or if there is any need for evaluation, notify the ES&H Team.
- Provide the following:
  - Specific training on hazards that may be encountered on the job.
  - Follow-on training for specific hazards to include an ongoing program of safety meetings; environmental, safety, and health courses; and discussions between workers and supervisors.
  - Training for nonroutine tasks (e.g., cleaning tanks or working on unlabeled pipes) before each job.
  - Training on the use of facility-specific alarm systems, emergency procedures, and precautionary measures for hazardous conditions.
  - Biohazard information (see Section 3.2).
- Periodically review the chemical inventory for each work area to determine what chemical hazards may be present.
- Ensure employees read the label or MSDS for new products and encourage them to ask questions.
- With assistance from Hazards Control ES&H Teams and the Education & Training Division, inform employees about the information and training listed in Section 3.1.3.
- Request monitoring for the substances listed in Table 1, the operations listed in Section 3.1.1, potentially hazardous noise exposures, and for emissions from the nonionizing radiation sources listed in Appendix B.
- Prepare and update the Hazard Notice Door Sign immediately for new hazards and annually for removed hazards (see Appendix B). Place the sign outside each area where hazards exist.
- Obtain MSDSs for workers when necessary. (See Section 3.1.1 for details.)
- Ensure that the controls required by *ES&H Manual*, safety plans (FSPs and OSPs), and any other applicable safety-related documentation have been implemented.
- Report the unsafe activities of workers to the responsible payroll supervisor.
- Shut down unsafe operations.
- Take course HS4050-W (Health Hazards Communications for Supervisors) and HS4052-W (Health Hazards Communication for Supervisors of Chemical Labs) if supervising workers in chemistry or biochemistry laboratories who potentially may be exposed to workplace health hazards. These courses cover specific responsibilities for supervisors, the LLNL Health Hazard

Communication Program, and an overview of this document. They are available at the following URLs:

<http://www-training.llnl.gov/wbt/hc/HAZCOM/HazCom.html>

<http://www-training.llnl.gov/wbt/hc/ChemHAZCOM/HazCom.html>

**Note:** Nonsupervisors should take course HS4052-W if assigned to safety-related tasks in chemistry or biochemistry laboratories.

- Update LLNL-generated MSDSs within three months of being notified about significant new or changed information regarding the hazards of a chemical or ways to protect against hazards.

### 5.3 Workers

- Read the labels on containers of all materials involved in an activity prior to beginning work.
- Review the hazards listed on the Hazard Notice Door Sign prior to entering an area.
- Plan and conduct operations in accordance with established procedures and good safety practices.
- Comply with established requirements.
- Use prescribed protective equipment and clothing.
- Know where and how to obtain information on hazardous materials.
- Know the toxicity/hazards and precautionary procedures for the chemicals, physical or biological agents, and ergonomic stressors encountered in work areas.
- Comply with workplace monitoring requirements (e.g., wear belt-mounted pumps and lapel-mounted sampling equipment).
- Report questionable activities involving hazardous agents or conditions to the work supervisor or facility point of contact.
- Shut down unsafe operations.
- Notify the work supervisor when becoming aware of significant new or changed information regarding the hazards of a chemical or ways to protect against hazards.
- Request evaluation from the work supervisor of new or changed hazards.

#### **5.4 Hazards Control Department**

- Assist work supervisors with identifying and evaluating hazards that may be present in the work area.
- Evaluate the potential hazards of operations.
- Monitor the workplace to determine employee exposure levels, as required by 29 CFR 1910.1001–1910.1048 and to assess compliance with applicable occupational exposure limits when there is reason to believe excessive exposures are possible.
- Select or recommend the appropriate PPE and engineering controls for specific activities.
- Provide health hazard communication training to supervisors.
- Assist organizations and supervisors with employee training as requested. This includes
  - Offering computer-based training (CBT), web-based training, and class lectures that provide the core Haz Com information.
  - Offering Haz Com classes to specific groups upon request.
  - Answering questions that arise about container labels, MSDSs, and specific hazards in the workplace.
  - Providing ongoing training at safety meetings, as well as information about the hazards of materials.
- Maintain an employee exposure database.
- Notify program management if new hazards are identified.

#### **5.5 Environmental Protection Department**

- Administer and maintain the Laboratory's chemical inventory database.
- Complete an annual site-wide inventory of bar-coded chemical containers.
- Prepare required chemical inventory and use reports for internal customers and regulatory agencies.
- Assist chemical users and Material Distribution Division personnel (Receiving) with bar coding and chemical inventory activities upon request.
- Maintaining LLNL's MSDS filing and retrieval system and provide MSDSs upon request.

- Train TRRs and buyers to follow proper hazardous material purchasing procedures.
- Provide hazardous waste training.

## 5.6 Laboratory Counsel

Laboratory Counsel acts as the point of contact between LLNL and vendors requiring protection of trade secret data.

## 6.0 Work Standards

10 CFR 850, "Chronic Beryllium Disease Prevention Program."

10 CFR 1046, "Physical Protection of Security Interest," Appendix A, Subpart B, "Protective Force Personnel, Medical and Physical Fitness Group 1 Qualification Standards."

21 CFR 1308, "Schedules of Controlled Substances (Narcotics)."

29 CFR 1910 Subpart J, "General Environmental Controls."

29 CFR 1910.253, "Oxygen-Fuel Gas Welding and Cutting."

29 CFR 1910.1020, "Access to Employee Exposure and Medical Records."

29 CFR 1910.1030, "Bloodborne Pathogens."

29 CFR 1910.1200, "Hazard Communication."

29 CFR 1910.1450, "Occupational Exposure to Hazardous Chemicals in Laboratories."

29 CFR 1913.10, "Rules of Agency Practice and Procedure Concerning OSHA Access to Employee Medical Records."

29 CFR 1926, "Standards Improvement (Miscellaneous Changes) for General Industry and Construction Standards."

**Note:** Only those standards for which there is a medical surveillance requirement apply.)

40 CFR 170–171, "Federal Insecticide, Fungicide, and Rodenticide Act."

49 CFR 100–199, "Hazardous Materials Transportation."

49 CFR 382, "Department of Transportation, Drug Testing."

ANSI/B 31.1, "Power Piping Code."

ANSI Z-136.1–1993, "American National Standard for the Safe Use of Lasers."

ASME Boiler and Pressure Vessel Code.

Compressed Gas Association, *Safe Handling of Cryogenics*, Pamphlet P-12.

DOE O 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees," Attachment 2, "Contractor Requirement Document," Sections 1–11, 13–18 (delete item 18.a), 19 (delete item 19.d.3), and 22.

DOE O 452.2A/DOE STD 3016-96, "Safety of Nuclear Explosives Operations."

*Ergonomics Standard*, Lawrence Livermore National Laboratory, Livermore, CA, UCRL-AR-129931, Rev 1.

*Occupational Medicine Standard: Medical Evaluation of Employees*, Lawrence Livermore National Laboratory, Livermore, CA, UCRL-AR-129189.

*Pressure Safety Standard*, Lawrence Livermore National Laboratory, Livermore, CA, UCRL-AR-128970.

Public Law 91-596 § (5)(a)(1), OSHA General Duty Clause.

## 7.0 Resources for More Information

### 7.1 Contacts

For additional information regarding this document, contact the following:

- Hazard identification and area-specific training—area ES&H Team.
- General training, course scheduling, and information—Hazards Control Education and Training Division and Environmental Protection Department Training Group.
- Issues associated with the Health Hazard Communication Program—Hazards Control Industrial Hygiene Group.
- Medical records—Health Services.
- ChemTrack/MSDS hotline.

### 7.2 Applicable Lessons Learned

The Lessons Learned Program is available on the Internet at the following URL address:

[http://www-r.llnl.gov/es\\_and\\_h/lessons/lessons.shtml](http://www-r.llnl.gov/es_and_h/lessons/lessons.shtml)

### 7.3 Other Sources

ASME A13.1-1996, "Scheme for the Identification of Piping Systems."

ANSI Z400.1-1998, "Hazardous Industrial Chemicals—Material Safety Data Sheet—Preparatory."

NEMA Z535.2-1991, "American National Standard for Environmental and Facility Safety Signs and Labels."

NEMA Z535.3-1991, "American National Standard for Criteria for Safety Symbols."

NEMA Z535.4-1991, "American National Standard for Product Safety Signs."

NEMA Z535.5-1991, "American National Standard for Accident Prevention Tags (for Temporary Hazards)."

## Appendix A

### Terms and Definitions

Article	<p>An item that</p> <ol style="list-style-type: none"> <li>1. Is formed to a specific shape or design during manufacture.</li> <li>2. Has end-use function(s) dependent in whole or in part on its shape or design during end use.</li> <li>3. Does not release or otherwise result in exposure to a hazardous chemical under normal-use conditions.</li> </ol>
Chemical health hazard	<p>A chemical for which there is statistically significant evidence, based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "chemical health hazard" includes chemicals that are carcinogens; toxic or highly toxic agents; reproductive toxicants; irritants; corrosives; sensitizers; hepatotoxins; nephrotoxins; neurotoxins; agents that act on the hematopoietic system; and agents that damage the lungs, skin, eyes, or mucous membranes.</p>
Container	<p>Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, or storage tank that contains a hazardous chemical. For the purpose of this document, pipes or piping systems, engines, fuel tanks, or other operating systems in a vehicle are not considered to be containers.</p>
Exposure or exposed	<p>When a worker encounters a hazardous chemical or biological material, physical agent, or physical hazard during employment through any route of entry (e.g., inhalation, ingestion, skin contact, or absorption). According to 29 CFR 1910.1200, "Hazard Communication", potential exposure (e.g., accidental or possible exposure) as well as actual exposure, is also included.</p>



Foreseeable emergency	Any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that can result in an uncontrolled release of a hazardous chemical, or biological material, physical agent, or physical hazard into the workplace.
Hazardous chemical	Any chemical that presents a physical or health hazard.
Hazard warning	Any word, picture, or symbol (or a combination thereof) appearing on a label or other appropriate form of warning that conveys the hazard(s) of the chemical(s) or hazards in or associated with the container(s) or device(s).
Immediate use	When a hazardous chemical will be controlled and used only by the person who transfers it from a labeled container, and be used only within the work shift during which it is transferred.
Label	An object placed on containers, bottles, equipment, boxes, or other articles that provides identification and precautionary information to workers using text and graphics.
Laboratory	A fixed place where small amounts of many chemicals are used on a nonproduction basis for research purposes and where safety features (e.g., fume hoods) and procedures common to laboratories are in place. For the purpose of this document, "laboratory" includes any chemistry or biochemistry laboratory, not engaged in pilot plant, quality control or other production type work. Medical, Physics, and Engineering laboratories are not <i>laboratories</i> for the purpose of this document.
Material safety data sheet (MSDS)	<p>An MSDS for a chemical lists</p> <ul style="list-style-type: none"> <li>• The hazardous ingredients.</li> <li>• Its physical properties.</li> <li>• Fire and explosive hazards.</li> </ul>

Material safety data sheet  
(MSDS)  
(cont'd)

- Information on chemical and physical health hazards, reactivity, spills, and leaks.
- Special protective equipment and special precautions required.

MSDSs are also available for some biological agents at the following Internet address:

<http://www.hc-sc.gc.ca/hpb/lcdc/biosafety/msds/index.html>

NFPA/HMIS fire hazard  
rating

A rating assigned to the flammability hazard of a substance in accordance with the National Fire Protection Association (NFPA) Standard 704 or the National Paint and Coatings Association Hazardous Material Information System (HMIS). NFPA Standard 704 ratings range from 0 (nonhazardous) to 4 (extremely hazardous).

NFPA/HMIS health  
hazard rating

A rating assigned by the NFPA or HMIS to the health hazard of a substance that fire fighters may encounter. NFPA Standard 704 ratings range from 0 (nonhazardous) to 4 (extremely hazardous). Health hazard ratings assigned by HMIS may differ because they address health hazards that users (not fire fighters) may encounter.

NFPA/HMIS reactivity  
hazard rating

A rating assigned by the NFPA or HMIS to the reactivity hazard of a substance that fire fighters may encounter. NFPA Standard 704 ratings range from 0 (nonhazardous) to 4 (extremely hazardous).

Payroll supervisor

The supervisor associated with a payroll account. He/she is responsible for the general supervision of technical and specialty personnel who support program activities. The payroll supervisor is responsible for ensuring personnel have appropriate skills for their job assignments; gathering training requirements for the projects their personnel support; and tracking completion of training requirements. They also prepare performance appraisals, manage return-to-work and illness and injury issues, and are critical to the accountability and reward process.

Permissible exposure  
limit (PEL)

The maximum average or peak concentration of a potentially toxic material workers can be exposed to for some specified time period according to OSHA regulations.

Physical agent	Nonionizing fields and radiation (e.g., microwaves, magnetic fields), lasers, noise, vibration, pressure extremes, etc.
Physical hazard	<ol style="list-style-type: none"><li>1. A chemical for which there is scientifically valid evidence that it is combustible liquid, compressed gas, explosive, flammable, organic peroxide, oxidizer, pyrophoric, unstable (reactive), or water reactive.</li><li>2. For the purpose of the Hazard Notice Door Sign, moving machinery, electrical sources, high pressure, and ergonomic hazards are also included in this definition.</li></ol>
Produce	To manufacture, process, formulate, or repackage.
Responsible party	Someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.
Sign	An object displayed at the entrance to a room (or some other place) that provides information using text and graphics.
Trade secret	Any confidential formula, pattern, process, device, information, or compilation of information used in an employer's business that gives the employer an advantage over competitors who do not know or use such information.
Work area	A room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.
Workplace	An establishment, job site, or project at one geographical location containing one or more work areas.

## Appendix B

### Hazards to be Listed on Hazard Notice Door Sign

Contract 48 requires the hazards for each workplace to be listed. The Hazard Notice Door Sign (see Fig. B-1; also known as the Health Hazard Communication Poster) shall be used to list the hazards below if they are present in the workplace or when there is a potential for occupationally related exposure.

**Note:** There may be other similar hazards not included on these lists that should also be included on the door signs. Document 12.1 contains more information about other required signs.

If hazards are present only during temporary maintenance or construction activities, they are not normally put on a Hazard Notice Door Sign. However, if these temporary activities are not generally performed by the public and pose a hazard to other workers in the area, additional warning signs may be required, as described in this and other sections of the *ES&H Manual*.

Potential hazards at LLNL are listed under the chemical, biological, physical agent, and physical hazard categories below.

#### B.1 Chemical Hazards

- Combustibles or flammables
- Corrosives
- Oxidizers
- Explosives, pyrophorics, or reactives
- Compressed gasses
- Systemic toxins
- OSHA "select carcinogens" or reproductive hazards
- Beryllium
- Large amounts of a single hazardous substance (e.g., >5 gal nitric acid)

# NOTICE

**The following hazards  
are present in this area:**

**Building:**

**Room:**

<input type="checkbox"/> Ionizing radiation	<input type="checkbox"/> Carcinogen	<input type="checkbox"/> Moving machinery
<input type="checkbox"/> Radioactive Materials Mgmt. Area	<input type="checkbox"/> Acute toxic	<input type="checkbox"/> Electrical source
<input type="checkbox"/> Flammables	<input type="checkbox"/> Reproductive hazard	<input type="checkbox"/> High pressure
<input type="checkbox"/> Reactive chemicals	<input type="checkbox"/> High noise	<input type="checkbox"/> Explosives
<input type="checkbox"/> Nonionizing radiation	<input type="checkbox"/> Biohazards	<input type="checkbox"/> Other (list): _____ _____ _____

## Hazards & Precautions:

☐

Eye protection required

☐

No eating, drinking or smoking

☐

Other precautions \_\_\_\_\_  
\_\_\_\_\_

Additional guidance about precautions is found in the following safety plans/documentation:

Applicable LLNL ES&H Manual Document

☐

Chemical Hygiene (14.2)

☐

Hazard Communication (10.2)

Material Safety Data Sheets are available at ext. 4-4404 and through the LLNL MSDS website.

Additional information can be obtained from:

Responsible Individual: \_\_\_\_\_ Page: \_\_\_\_\_ Ext: \_\_\_\_\_ Home phone: \_\_\_\_\_

Facility point of contact: \_\_\_\_\_ Page: \_\_\_\_\_ Ext: \_\_\_\_\_ Home phone: \_\_\_\_\_

ES&H Team representative: \_\_\_\_\_ Page: \_\_\_\_\_ Ext: \_\_\_\_\_

HWM technician: \_\_\_\_\_ Page: \_\_\_\_\_ Ext: \_\_\_\_\_ Date prepared: \_\_\_\_\_

For off-shift support call ext. 2-7595

## B.2 Biological Hazards

- Human fluids, secretions, or feces
- Class II and III etiologic agents
- Biological toxins
- Recombinant DNA work
- Cell and tissue culture systems
- Research involving laboratory animals
- Research involving allergens of biological origin (e.g., plant and animal products, dander, urine, and some enzymes)
- Contaminated laundry soiled with blood or other potentially infectious materials
- Contaminated sharps
- Unfixed human tissue or organs

## B.3 Physical Agents

- Steady (dc) magnets that could generate fields above 0.5 mT (5 G) to the chest under normal-use conditions. Common horseshoe and bar magnets do not need to be posted but, for example, Faraday rotators with permanent magnets or other larger permanent magnets shall be posted on the Hazards Notice Door Sign. Note that a small percentage of pacemakers could malfunction in fields weaker than 0.5 mT; the most sensitive known pacemaker could malfunction in a 0.31-mT (3.1-G) field.
- Equipment that operates above 2.5 kV at 60 Hz (this information is given on the nameplate) without electric field shielding between the source and people. Call your ES&H Team industrial hygienist to evaluate exposures from the equipment because it may be hazardous to pacemaker users in some cases.
- Equipment that operates above 100 A at 60 Hz (this information is given on the nameplate). Call your ES&H Team industrial hygienist to evaluate exposures from the equipment because it may be hazardous to pacemaker users in some cases.

**Note:** Equipment in this category may have unusually thick power cables.

- All permanently installed radio frequency (rf) gear capable of radiating over 1 W into an open area at frequencies between 3 kHz and 300 GHz, or of emitting over 100 W if the output is normally completely enclosed by coaxial cables, waveguides, or dummy or real loads. Call your ES&H Team industrial hygienist to evaluate exposures from the equipment. Use of this equipment could result in excessive exposures in some cases.
- All satellite and permanently installed communications transmitters. (Receivers do not have to be listed.) Call your ES&H Team industrial hygienist to evaluate exposures from the equipment. Use of such equipment could result in excessive exposures in some cases.
- Portable walkie-talkie communication sets capable of radiating over 7 W at frequencies between 100 kHz and 450 MHz, and over 7 W (450/fm) at frequencies between 450 MHz and 1.5 GHz (fm = frequency in MHz units). Call your ES&H Team industrial hygienist to evaluate exposures from the equipment. Use of such equipment could result in excessive exposures in some cases.
- Any energy emitter regulated or potentially regulated by the Federal Communications Commission (FCC). Measurements may be required by FCC regulations.
- All induction heaters. Call your ES&H Team industrial hygienist to evaluate exposures from the equipment. Use of such equipment could result in excessive exposures in some cases.
- Main power-supply rooms of buildings. Call your ES&H Team industrial hygienist to evaluate exposures from the equipment. Some equipment can be hazardous to pacemaker users.
- Class 3b and 4 lasers. These are hazardous to the eyes and skin if excessive exposure occurs.
- Infrared sources >10W. Use of these sources could result in excessive exposures in some cases.
- Arc lamps. Use of these lamps could result in excessive exposures in some cases.
- Ultraviolet sources >1 W. Use of these sources could result in excessive exposures in some cases.

**Note:** Microwave ovens, household appliances (e.g., refrigerators, microwave/conventional ovens), cellular phones, video display terminals (VDTs), and light bulbs/lamps used for area or task lighting do not have to be listed on the Hazard Notice Door Sign. Likewise,

storage locations do not have to be listed if the equipment is stored in a condition where it cannot emit energy. For example, rf emitters or lasers would not be inventoried at storage locations. But when there is any doubt, the equipment should be listed.

- Noise sources >85 dBA or any noise source that causes perceptible discomfort or a ringing in the ears after exposure. Note that sources >85 dBA are usually present in places where it is necessary to raise one's voice to speak to someone 2 ft or less away.

#### **B.4 Physical Hazards**

Use the following guidance to help determine when physical hazards should be listed on a Hazard Notice Door Sign. List the hazards in the following cases:

- Electrical hazards—if exposure to unprotected sources in excess of 50V is possible.
- Moving machinery hazards—if reciprocating parts or cutting surfaces may pose a hazard or if there is a potential for exposure to flying objects or particles.
- High pressure hazards—when high-pressure systems are present.
- Explosives hazards—in explosive-handling areas.
- Other hazards including areas with any of the following:
  - Low overhead clearance.
  - Required fall protection.
  - Steam generating systems.
  - Equipment with more than one energy source.
  - Any other recognized safety hazard.

Door signs are not used to communicate ergonomic hazards because they vary from job to job. The work supervisor is responsible for communicating specific ergonomic hazards and the associated controls.

Hazard Notice Door Signs are *not* required for physical hazards if other signs or warnings are present (for example for radiation hazards) or for hazards associated with tasks generally performed by the public.



## Appendix C

### Guidelines for Requesting and Preparing Material Safety Data Sheets

#### C.1 Requesting MSDSs

The fastest way to obtain MSDSs is usually to go directly to the LLNL MSDS Internet site. Workers who do not have access to a networked computer can either ask their supervisor for a copy or call the MSDS coordinator at ext. 4-4404. Alternatively, workers may use the request form at the end of this appendix to obtain MSDSs. To discuss any problems or special needs, call the MSDS hotline or send an e-mail message to the MSDS coordinator at [msds@llnl.gov](mailto:msds@llnl.gov).

#### C.2 Preparing MSDSs

Whenever a new hazardous material is synthesized or formulated, the producer (usually the program) is required to prepare an MSDS before the material can be sent to another workplace (within the Laboratory or offsite), unless the only person handling the new chemical is the originator.

**Note:** There is no de minimis or exempt quantity, however, hazardous wastes are exempted from the requirement to prepare an MSDS.

For example, if another organization will use a new compound developed at the Laboratory, LLNL must develop the MSDS to accompany the material. This appendix describes the general approach for writing and distributing LLNL-prepared MSDSs. Requirements mandated by OSHA can be found in 29 CFR 1910.1200(g) and appendices.

##### C.2.1 MSDS Content

Each MSDS shall contain the following:

- Identity of the material, including hazardous ingredients comprising 1% or more of mixtures, or 0.1% or more of carcinogens. Refer to the LLNL Controlled Carcinogen List for Laboratories in Document 14.12, "Safe Handling of Carcinogenic Materials," in the *ES&H Manual*. The complete IARC and NTP lists of carcinogens are available at the following Internet address:

<http://ctmsds.llnl.gov:1650/livehtml/ChemSafety/chemsafety.html>

- Physical and chemical characteristics.

- Physical hazards, including the potential for fire, explosion, and reactivity.
- Health hazards, including signs and symptoms of exposure, and any medical conditions generally recognized as being aggravated by exposure to the chemical.
- Primary routes of entry into the body.
- OSHA's permissible exposure limit, the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit value, and any other exposure limit that has been recommended and adopted for use at LLNL.
- Whether the hazardous chemical is listed as a carcinogen.
- Any generally applicable precautions for safe handling.
- Any generally applicable control measures such as engineering controls, work practices, or PPE.
- Emergency and first-aid procedures.
- Date the MSDS was prepared or last changed.
- Name, address, and telephone number of the responsible party who prepared and distributed the MSDS and can provide additional information on the hazards and appropriate emergency procedures.

### **C.2.2 Technical Input**

Thorough completion of the MSDS requires technical information from the following:

- Chemical producer
- Health Services Department
- Hazards Control Department
- Environmental Protection Department

The latter three may be contacted through the area ES&H Team. In addition, technical experts from other LLNL organizations may be consulted for their particular expertise and to review assembled material.

### **C.2.3 Data Sources**

The Laboratory is not required to conduct new or additional health and safety testing of a product if the test results from scientific literature are accepted. Besides this literature, contacts and reports available through the DOE complex should be identified and

considered for inclusion. If no relevant information is found for a given category, the MSDS shall be marked to indicate that finding.

#### **C.2.4 Updates**

When workers become aware of significant information regarding the hazards of a chemical or ways to protect against hazards, they shall notify the MSDS generator, who is responsible for updating the MSDS within three months.

The ES&H Team industrial hygienist will coordinate the preparation and updates of MSDSs and serve as the contact point for outside organizations as requested.

## MSDS Request Form

Requester's name: \_\_\_\_\_

Phone no.: \_\_\_\_\_ Fax no.: \_\_\_\_\_ L-code: \_\_\_\_\_

Date requested: \_\_\_\_\_ Date needed: \_\_\_\_\_

Purpose why MSDS is needed: \_\_\_\_\_

\_\_\_\_\_

**Company name**

**Product name**

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

*Both the **company name** and **product name** should be completed whenever possible.*

Send or fax completed requests to:

**MSDS coordinator, L-621**

**MSDS fax extension: 3-9027**

**MSDS hotline phone extension: 4-4404**

Date Complete: \_\_\_\_\_

## Appendix D

### Haz Com Courses

The formal courses in this appendix are offered by various organizations at the Laboratory for employees and supervisors who work with hazardous chemicals. This list of courses is subject to ongoing changes, so be sure to check the online LLNL Course Catalog for the most up-to-date information or contact your area ES&H Team.

Table D-1. Haz Com related courses.

Course Number/ Title/Length	Content	Who should attend
HS0001 or HS0001-W, New Employee Safety Orientation—2 hours; required one time only	<p>Topics include</p> <ul style="list-style-type: none"> <li>• The LLNL Health and Safety Program</li> <li>• Radiological safety information for general employees</li> </ul>	All new employees and contractors at LLNL
HS4050-W, Health Hazards Communication for Supervisors—1.5 hours; required one time only.	<p>This web-based course meets the requirements by 29 CFR 1910.1200. It prepares supervisors to implement the OSHA Hazard Communication Standard. The content in this course differs from that of course HS4052, which is for supervisors of research laboratories. <i>This course is not required for supervisors of employees who work in offices and other areas where there is negligible contact with common consumer products that contain chemical ingredients.</i></p> <p>Topics include</p> <ul style="list-style-type: none"> <li>• Chemical, physical, and biological health hazards</li> <li>• Employee training needs</li> <li>• Labeling</li> <li>• Posting</li> <li>• MSDSs</li> <li>• Inventory reporting requirements</li> </ul>	Required for work supervisors of employees who handle hazardous materials in areas other than chemical, materials science, and biochemistry laboratories

Table D-1. Haz Com related courses (cont'd).

Course Number/ Title/Length	Content	Who should attend
HS4052-W, Health Hazards Communication for Supervisors of Chemical Labs—1.5 hours; required one time only.	<p>This web-based course prepares supervisors to implement the requirements of the OSHA Laboratory Safety Standard and the DOE health hazards training orders. It only presents material applicable to research laboratories that use chemicals (e.g., chemical, materials science, and biochemistry laboratories). Topics covered include</p> <ul style="list-style-type: none"> <li>• LLNL's Chemical Hygiene Plan</li> <li>• Employee training needs</li> <li>• Hazardous agents</li> <li>• Labeling</li> <li>• Posting</li> <li>• MSDSs</li> <li>• Inventory reporting requirements</li> </ul>	Supervisors who work in chemistry, materials science, or biochemistry laboratories
HS4200, Hydrofluoric Acid—0.5 hours; required one time only.	<p>This course covers the unique health hazards and precautions associated with handling hydrofluoric acid.</p> <p>Topics include:</p> <ul style="list-style-type: none"> <li>• First-aid requirements for exposure</li> <li>• Safe use</li> <li>• Storage</li> <li>• Small laboratory-scale spill response</li> </ul>	Employees and supplemental laborers who handle or that plan to handle hydrofluoric acid
HS4240-CBT Chemical Safety—3 hours; required one time only.	<p>Topics include</p> <ul style="list-style-type: none"> <li>• Introduction to chemical hazards</li> <li>• Handling chemicals and safe work habits</li> <li>• Controls</li> <li>• Emergencies</li> </ul>	<p>Employees who transport, handle, or work with chemicals in areas other than laboratories.</p> <p>Employees who work with chemicals in laboratories should take course HS4246, Laboratory Safety.</p>
HS4242, Special Training for Toxic Laser Dye Solution—1 hour; one time only.	<p>This course provides information about the known and potential hazards of laser dyes and recommended controls. It assumes the employee is generally familiar with chemicals.</p>	Recommended for people who handle laser dyes.

Table D-1. Haz Com related courses (cont'd).

Course Number/ Title/Length	Content	Who should attend
HS4246-CBT, Laboratory Safety—3 hours; required one time only.	The emphasis in this course is on laboratory-scale procedures. Topics include <ul style="list-style-type: none"> <li>• The known and potential hazards of laser dyes</li> <li>• Chemical hazards</li> <li>• Safety precautions</li> <li>• Emergencies</li> <li>• Safe laboratory practices</li> </ul>	Employees who work in chemistry or biochemistry laboratories
HS4255, Beryllium— 1 hour; required one time only.	This course covers the health hazards and precautions associated with beryllium metal and common beryllium compounds. Topics include <ul style="list-style-type: none"> <li>• Safe use, handling, protective equipment, and engineering and administrative controls</li> <li>• Cleanup of small spills</li> </ul>	Recommended for employees who work with beryllium in a form where airborne exposure is possible
HS4261-W, Lead Awareness—0.5 hour; required one time only.	This course provides lead awareness training for employees who may encounter low-level lead exposure in the workplace. Those who may encounter high-level lead exposure must take course HS4262. Topics include <ul style="list-style-type: none"> <li>• Why should I worry about lead?</li> <li>• How does lead affect my body?</li> <li>• How can I protect myself?</li> <li>• Should I notify Health Services?</li> </ul>	Required for individuals who may be exposed to low levels of lead.
HS4262, Lead Worker Training—1.5 hours; required one time only.	This course provides information about working with lead-containing paint and other articles containing lead.	Required for lead workers.
HS4360-CBT, Noise—1.5 hours; required every 12 months, with annual refresher training (HS4360-R).	This OSHA-required course covers hearing physiology, the physics of sound, and how excessive noise causes annoyance and affects human hearing. Other topics include <ul style="list-style-type: none"> <li>• Noise-exposure standards</li> <li>• Methods for controlling noise levels</li> <li>• Health effects of noise</li> </ul>	Required for employees exposed to high-noise levels.

Table D-1. Haz Com related courses (cont'd).

Course Number/ Title/Length	Content	Who should attend
HS4370-W, Fields and Waves—2 hours; required one time only.	This web-based course covers the health effects of radio frequency/microwave (rfmw) radiation and fields and dc magnetic fields. Available at <a href="http://www-training.llnl.gov/training/hc/NonIonizing/NonIonizing.html">http://www-training.llnl.gov/training/hc/NonIonizing/NonIonizing.html</a>	Employees who work with rfmw and/or dc magnetic fields.
HS4400, Working Safely with Blood and Blood-Borne Pathogens—3 hours; Follow-up training in course HS4400-RW required every 12 months.	This course is required by 29 CFR 1910.1030 for employees who work directly with blood-borne pathogens, human blood, human tissues, or other body fluids. It covers <ul style="list-style-type: none"> <li>• Risk of occupational exposure to hepatitis B and HIV viruses and other blood-borne pathogens</li> <li>• Exposure prevention and medical monitoring studies</li> </ul>	Required for employees who work with human fluids, tissue, or blood-borne pathogens
HS4400-RW, Working Safely with Blood and Blood-Borne Pathogens—3 hours; to be repeated every 12 months.  Prerequisite course: Required instruction/competence prior to taking HS4400-RW	This course is required by 29 CFR 1910.1030 for employees who work directly with blood-borne pathogens, human blood, human tissues, or other body fluids. It covers <ul style="list-style-type: none"> <li>• Risk of occupational exposure to hepatitis B and HIV viruses and other blood-borne pathogens</li> <li>• Exposure prevention and medical monitoring studies</li> </ul>	Employees who work with human fluids, tissue, or blood-borne pathogens
HS4420, Asbestos Safety—2 hours; required one time only.	This course covers the health effects associated with exposure to asbestos. Topics include <ul style="list-style-type: none"> <li>• Relationship between smoking, asbestos, and cancer</li> <li>• Recognition and identification of asbestos-containing materials</li> <li>• Spill notification procedures</li> <li>• Health effects of asbestos exposure</li> </ul>	Required by OSHA for employees such as custodians and facility maintenance workers who may disturb asbestos-containing building materials. Note: this course is not intended for asbestos removal or repair workers. For information on specialized training for this work, contact the area ES&H Team.



Table D-1. Haz Com related courses (cont'd).

Course Number/ Title/Length	Content	Who should attend
HS4361, Noise for Hearing Conservation—0.5 hours; required every 12 months. (The course is given at Health Services in conjunction with the employee's annual audiometric exam.)	This course is required by 29 CFR 1910.95. It covers <ul style="list-style-type: none"> <li>• Noise-exposure standards</li> <li>• Methods for controlling noise levels</li> <li>• Proper use and maintenance of protective ear plugs and muffs</li> <li>• Health effects of noise</li> <li>• Purpose of audiometric testing and test procedures</li> </ul>	Required for employees exposed to high noise levels and those enrolled in the LLNL Hearing Conservation Program.
HS5200CBT, Laser Safety—2 hours; required every 5 years.	This course is required by ANSI Z136.1. It covers <ul style="list-style-type: none"> <li>• Injury statistics</li> <li>• Laser laboratory hazards</li> <li>• Effects of overexposure</li> <li>• Maximum permissible exposure</li> <li>• Methods for controlling hazards, including engineering and administrative controls</li> <li>• PPE</li> </ul>	Employees who work with or near exposed Class 3b or 4 laser energy or who service a system containing such energy. <i>This course is also recommended for employees who work with or near class 2 or 3a lasers.</i>
HS5300, Back Care Workshop—3 hours; required one time only.	The topics in this CBT course include <ul style="list-style-type: none"> <li>• Proper lifting, sitting, and standing</li> <li>• Nature of back injuries</li> <li>• Methods for preventing back pain</li> <li>• Exercises to strengthen the back</li> </ul>	Employees assigned to continuous high-intensity repetitive tasks that repeatedly stress the same body parts without interruption for 4 hours or more per day.
HS5310-CBT, Video Display Terminal Ergonomics—1.5 hours; required one time only.	This course is required by Document 19.1. Topics include <ul style="list-style-type: none"> <li>• Causes of repetitive-motion injuries</li> <li>• Adjustment of chairs, furniture, document holders, mouse devices, etc.</li> <li>• Vision</li> <li>• Lighting and glare</li> <li>• Breaks and rest periods</li> <li>• Keyboarding</li> </ul>	Required for employees who work at visual display terminals (VDTs) and computer workstations, and individuals assigned to continuous high-intensity repetitive tasks that repeatedly stress the same body parts without interruption for 4 hours or more per day.

Table D-1. Haz Com related courses (cont'd).

Course Number/ Title/Length	Content	Who should attend
HS5311, Ergonomics—The Selection and Use of Hand Tools—1.5 hours; required one time only.	<p>Classroom instruction on how to select and use hand tools in an ergonomically correct way as well as how to prevent cumulative trauma injuries. Topics include</p> <ul style="list-style-type: none"> <li>• Hand tools</li> <li>• Pressure</li> <li>• Vibration</li> <li>• Stress</li> <li>• Breaks and rest periods</li> </ul>	Required for mechanics, carpenters, electricians, and other employees who work with hand tools.
HS5312, Video Display Terminal Ergonomics for the Supervisor/Evaluator—Basic—4 hours; required one time only.	<p>Classroom instruction in the basics of VDT ergonomics for supervisors and evaluators of employees who work at VDTs. Participants will learn how to evaluate and adjust workstations to prevent cumulative trauma injuries. This course requires participants to conduct a workstation evaluation. Topics include</p> <ul style="list-style-type: none"> <li>• Causes of cumulative trauma injuries</li> <li>• Proper positioning of furniture, mouse devices, document holders, lighting, keyboards, etc.</li> <li>• Breaks and rest periods</li> </ul>	Required for supervisors or evaluators of employees who work at VDTs and computer workstations and individuals assigned to continuous high-intensity repetitive tasks that repeatedly stress the same body parts without interruption for 4 hours or more per day.